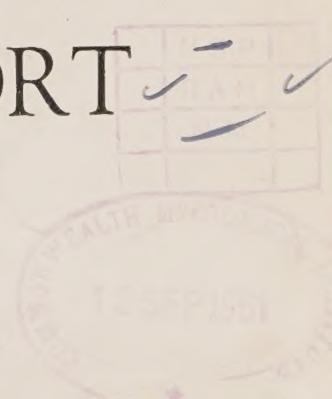


BRITISH WEST INDIES
CENTRAL SUGAR CANE BREEDING STATION



TWENTY-SEVENTH
ANNUAL REPORT

1959 — 1960



BRITISH WEST INDIES
CENTRAL SUGAR CANE
BREEDING STATION
BARBADOS



Twenty-seventh Annual Report
for the year ending 30th September, 1960

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Introduction

The growing season of 1959 was a good one at Groves, with rainfall adequate and well distributed. The severe drought which affected the low-rainfall areas of the island, particularly to the windward side, was not felt to a marked extent at the higher elevations, and in any case irrigation facilities were available at the breeding plots to supplement natural rainfall if necessary. Conditions for flowering were favourable, and a full breeding programme was carried out. Details of this are given elsewhere in this report.

About half the breeding programme was carried out by the solution technique in the lantern-batteries at Codrington, and it is the intention to change over progressively to this method as the old field lanterns become unserviceable. The advantages in expense, time and labour have been described in previous reports.

While for some crosses made by the solution method germinations were moderately good, in other cases the results were disappointing. As a consequence an investigation was undertaken to evolve suitable methods for standardising the preparation and use of the preservative solution, to study the rate of deterioration of the solution when in use, and to test some modifications of the solution and of the method of handling the arrows during the pollination period. Very little has been published on these subjects, even in countries where the solution method has been the standard breeding procedure for many years. Some notes on the investigation and its findings are to be found later in this report, under "Research Work".

The roofed drying area at Codrington, where pollinated arrows are placed for fuzz maturation, was enclosed by sides of woven plastic cloth, which while allowing adequate ventilation, minimised wind currents which are most undesirable when the fuzz from ripe arrows is being harvested.

Modifications in nursery procedure were made to ensure better growth of the seedlings. Most important among these were trials with containers to replace the earthenware pots which have been used previously, and which have increased in price considerably in recent years. Both tarred cardboard and perforated polythene pots were tried. The latter showed much promise, and supported such healthy seedling growth, that they are to be used on a large scale next year.

As in previous years, a proportion of the seedlings was planted in the nursery in bunches. Experiments were also carried out to study the behaviour of seedlings in bunches, notably by recording survival in synthetic bunches made up from single-eye cuttings of varieties known to differ markedly in early vigour and tillering. Results have thrown doubt on the value of the bunch-planting method under Barbados conditions, and during the year under reference a far lesser proportion of the nursery area was planted to bunches. In this connection it will be recalled that the bunch-planting method was evolved in Hawaii not as an alternative to space-planting of single seedlings, but as a means of handling the vastly increased seedling numbers obtained from "melting-pot" crosses in solution, without a correspondingly vast increase in nursery space. No experienced sugar cane breeder would doubt the advantages of single-planting all seedlings if space and labour were available.

In the windward districts the long drought in the growing season of 1959 presented a very specialised environment for cane growth and for variety selection. In the Second Year Trial at River Plantation, rainfall was so low that some plots died out, while in plots which survived, growth was negligible until after satisfactory rains were received in September. Varieties giving reasonable yields under such conditions exhibit an admirable degree of drought-resistance. In commercial

plantations, B.49119 was best able to stand up to the dry conditions, and gave outstanding results in comparison with other varieties.

Barbados is fortunate in having no major disease of sugar cane at present. Both mosaic and gumming were of commercial importance twenty years or so ago, but with the continued large-scale use of resistant varieties, the pathogens have disappeared, and symptoms are no longer found even on susceptible varieties. In the case of mosaic, there is evidence that the virus became progressively more and more attenuated before finally disappearing. Mosaic disease resistance ratings for Barbados varieties are now recorded in Jamaica by officers of the Research Department of the Sugar Manufacturers' Association, whose valuable co-operation is acknowledged. Present evidence indicates that the disease is of decreasing importance in Jamaica, and, to judge by the resistance data recently obtained, it would appear that there, too, an attenuation of the virus is taking place. This, together with the use of varieties which are predominantly resistant or immune, raises the hope that in the not-too-distant future, Jamaica will also be free of mosaic disease.

The Geneticist visited British Guiana in February—March, 1960, to observe the progress made with testing Barbados seedlings there, to see the leaf scald disease resistance testing, and to discuss with the Sugar Agronomist certain modifications in the seedling testing programme and associated experimental work.

Visitors to the Station during the year included scientists from England, France, Portugal, Colombia, Guadeloupe, Venezuela, St. Croix, Trinidad and British Guiana.

The Advisory Committee met in Barbados in December 1959.

The staff of the Station maintained close co-operation with that of the Barbados Department of Science and Agriculture, and we are indebted to the Director of Agriculture for facilities offered and assistance received.

The following publication was issued during the year.

WALKER, D.I.T. — "Report on a Visit to British Guiana, February — March, 1960." Mimeographed.

Sugar Cane Breeding — Seedling Raising and Preliminary Eliminations

(a) Breeding:

The weather up to the end of May was ideal, but thereafter a very dry spell set in until the end of September. Rainfall in October was good, but November was relatively dry. Fairly good rains were received again towards the end of December. The well at Groves went dry in July, was cleaned and deepened and functioned well thereafter. Flowering was reasonably good under the circumstances, and a large breeding programme was undertaken. 138 crosses and 23 selfs and sib-crosses were made at Groves, and germination from these was satisfactory, while 159 crosses were made in solution at Codrington. In addition to the above seed from 28 polycrosses was sent to Jamaica and Romana and from 29 polycrosses to British Guiana, while seed from 52 varieties, open pollinated, was sent to all three countries.

(b) Seedling raising, potting and planting in the Field Nursery:

Germination, as has been mentioned above was satisfactory from the crosses made at Groves, but was very poor from many of those done in solution at Codrington. It is estimated that approximately 54,000 seedlings germinated. In addition to this, approximately 41,000 seedlings germinated from fuzz sent to British Guiana, 48,951 in the Dominican Republic and 39,369 in Jamaica, making a total of approximately 129,320 for the year.

Table I gives under group heads, a list of the numbers of crosses made, the numbers of seedlings germinated, and the numbers planted in the First Year Seedling Nursery, and details are shown in Appendix I.

Seedlings in excess of potting facilities were planted as large bunches in the field straight from the original seedling boxes.

TABLE 1.
SUMMARY OF BREEDING PROGRAMME 1959—60 FOR THE B.62' SERIES

GROUP	No. of Crosses	No. Germin- ted	NO. PLANTED IN FIELD NURSERY	
			Singles	Bunches
<i>S. officinarum</i>	1	1,503	215	211
<i>S. officinarum</i> x <i>S. spontaneum</i>	9	1,594	1,440	—
<i>S. officinarum</i> x <i>S. sinense</i>	1	2	2	—
<i>S. officinarum</i> x <i>S. robustum</i>	2	2,555	548	355
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. spontaneum</i>	7	993	877	11
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> ...	72	23,010	11,945	1,603
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> ...	2	18	18	—
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. sinense</i> ...	1	5	—	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i>	36	19,229	7,427	1,831
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. robustum</i>	5	1,224	1,088	—
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. robustum</i> ...	1	200	161	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i>	5	1,231	836	63
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> x <i>S. robustum</i>	1	169	168	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i> x <i>S. robustum</i>	3	778	731	—
TOTALS	146	52,511	25,456	4,074
Selfs and Inbreds for the Research Programme	16	1,439	1,271	—
GRAND TOTALS	162	53,950	26,727	4,074

Again, the number of seedlings raised from crossed involving *S. sinense* was high. This follows the observation that many of the most promising seedlings of recent years have had "sinense blood" in their breeding.

(c) Planting the First Year Seedling Trial — B.61' Series:

The seedlings of this series were bred in 1958, potted and planted in the Field Nursery in May 1959. In October 1959, the seedlings in the Field Nursery were examined and unsuitable types were eliminated. The remaining 5,381 seedlings were planted in the First Year Seedling Trial. As in recent years, a stool of the standard variety B.41211, was planted every fifth stool throughout the trial for the purposes of comparison.

Table II gives under group heads, the numbers of crosses, the numbers of seedlings in the First Year Seedling Nursery, and the numbers of seedlings in the First Year Seedling Trial. Details are given in Appendix II.

TABLE II.
SUMMARY OF NURSERY SELECTION FOR THE B.61' SERIES

GROUP	No. of Crosses	No. PLANTED IN THE FIELD NURSERY		No. Planted in First Year Seed- ling Trial
		Singles	Bunches	
<i>S. officinarum</i>	2	359	57	57
<i>S. officinarum</i> x <i>S. spontaneum</i>	9	1,773	401	270
<i>S. officinarum</i> x <i>S. barberi</i>	4	77	—	20
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> ...	100	14,714	3,063	3,677
<i>S. officinarum</i> x <i>S. sinense</i>	5	100	—	19
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> ...	10	968	102	217
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i>	22	3,069	1,032	824
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. robustum</i>	4	611	—	50
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i>	8	433	106	123
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i> x <i>S. robustum</i>	2	388	120	62
Open pollinated	—	—	—*	62
TOTALS	166	22,492	4,881	5,381

* not estimated.

(d) Reaping the First Year Seedling Trial — B.60' Series:

The seedlings of this series were bred in 1957—58, potted and planted in the Field Nursery in May 1958 and into the First Year Seedling Trial in October 1958. The seedlings were cut in February 1960.

There was no change in the selection methods. The seedlings were cut, cleaned, bundled and laid out for inspection. Selection was made initially on appearance, and was based to some extent on comparison with neighbouring stools of the standard variety. After selection, the following data was taken:— (1) number of canes per stool; (2) number of rotten canes per stool; (3) percentage arrowing; (4) weight in lb; and (5) hand refractometer brix readings. The latter readings were calculated as the means of samples from the middle of all millable canes in the stool, thus removing any bias on the part of the scaleman in selecting canes for brix sampling. All seedlings from which data are taken are designated 'Field Selections'. However, if the brix does not reach a certain standard, the

seedling is discarded in the field. Later, a further selection is made after consideration of the field data. Any varieties which come through this stage are known as 'Final Selections', and are planted in multiplication plots with a view to their being planted in Second Year Seedling Trials or in the Breeding Plots during the following planting season.

In this series 346 final selections were made. Details are given in Appendix III. B.41211 planted as a standard variety every fifth stool throughout the trial gave the following average results:—

CANES PER STOOL	...	...	11.5 ± 3.9
LB. PER STOOL	...	...	21.4 ± 10.5
BRIX	...	...	20.0 range 18.4 — 22.9

The brix figures varied from one side of the field to the other, and were of much help in selection. Selected seedlings varied from 15 to 81 lb. per stool, and no seedling with a brix of less than 20.0 was accepted.

(e) Planting the Second Year Seedling Trials — B.59' Series:

The 259 seedlings of the B.59' series were multiplied in ten-stool plots at Codrington Experiment Station. Single cuttings of each of these varieties were sent to Jamaica, British Guiana and La Romana for selection under their conditions. A further selection in October 1959 reduced this number to 151, and these were planted in Second Year Seedlings trials. In these trials the plot size is nine stools; the varieties are divided into groups of 18 seedlings each, and these together with two standard varieties are replicated three times. Each variety is planted in a trial in the low rainfall area and in a duplicate trial in the high rainfall area, so that each variety is eventually represented by 54 stools, 27 in the high and 27 in the low rainfall areas.

(f) Reaping the Second Year Seedling Trials — B.58' Series:

The one hundred and fifty-five varieties of the B.58' series were cut as plant canes in the Second Year Seedling Trials at the low rainfall stations, River and Foursquare, and in duplicate trials at the high rainfall stations, Bowmanston and Pool. Eighteen seedlings were selected in all, fifteen of which will be tested further in Barbados. The performances of standards and selected seedlings are given in Tables III and IV.

TABLE III.

SECOND YEAR TRIALS — B.58' SERIES — PLANT CANES

GROUPS I TO V.

*Low Rainfall Trial (L) ca 48" — FOURSQUARE — Reaped 9—11 March, 1960**High Rainfall Trial (H) ca 70" — POOL — Reaped 14—16 March, 1960*

VARIETY	PARENTAGE	NO. OF CANES PER STOOL (ROTTEN)		ARROWING		H.R. BRIX		TONS CANE PER ACRE	
		L	H	L	H	L	H	L	H
B.37161	Standard	14.8 (2.3)	—	nil	—	21.2	—	25.4	—
B.41211	Standard	14.8 (1.6)	—	nil	—	21.0	—	23.6	—
B.45151	Standard	—	20.7 (1.2)	—	6%	—	21.5	—	52.6
B.4744	Standard	—	17.0 (1.1)	—	4%	—	21.2	—	57.0
B.5801	B.3365 x B.51321	111 (serious)	103 (mod.)	nil	nil	113	105	83	88
B.5802	B.3439 x B.3337	159 (slight)	101 (mod.)	nil	mod.	110	96	154	81
B.5809	B.3439 x B.37193	139 (slight)	94 (mod.)	nil	nil	105	98	152	96
B.5863	B.4145 x B.41211	77 (bad)	104 (mod.)	nil	nil	98	97	79	105
B.5874	B.42279 x B.3337	123 (slight)	132 (slight)	nil	heavy	100	99	125	88
B.5891	B4362 x P. O.J.2878	124 (bad)	95 (mod.)	nil	heavy	104	107	105	89
B.58109	B.4906 x B.4098	72 (serious)	119 (mod.)	nil	light	106	101	59	89
B.58112	" x "	142 (slight)	123 (mod.)	nil	heavy	109	98	128	79
B.58114	" x "	109 (slight)	106 (slight)	nil	nil	112	104	105	87

Notes:— Performances of the standards are given as the averages of all groups involved. Those of the seedlings are expressed as a percentage of the standards, B.41211 (L) and B. 4744 (H) in their own groups. Rotten canes and arrowing are not closely compared with the standards, but are grouped as follows:—

ROTTEN CANES:— Nil; 1—4% slight; 5—10% moderate;
11—20% bad; over 20% serious.

ARROWING:— Nil; 1—10% light; 11—25% moderate;
over 25% heavy.

TABLE IV.
SECOND YEAR TRIALS — B.58' SERIES — PLANT CANES (Cont'd)
GROUPS VI TO IX

Low Rainfall Trial (L) ca. 50" — RIVER Reaped 29 Feb. & 1 March, 1960
High Rainfall Trial (H) ca. 70" — BOWMANSTON — Reaped 4, 7 & 8 March, 1960

VARIETY	PARENTAGE	No. OF CANES PER STOOL (ROTTEN)		ARROWING		H.R. BRIX		TONS CANE PER ACRE	
		L	H	L	H	L	H	L	H
B.37161	Standard	11.9 (1.0)	—	nil	—	20.8	—	21.6	—
B.41211	Standard	13.2 (0.6)	—	nil	—	20.5	—	19.2	—
B.45151	Standard	—	19.2 (2.8)	—	2	—	21.1	—	48.2
B.4744	Standard	—	17.6 (1.8)	—	2	—	20.0	—	54.6
B.58137	B.50126 x B.42231	141 (slight)	153 (slight)	nil	heavy	105	111	128	124
B.58141	" x "	123 (slight)	135 (slight)	nil	nil	99	110	119	127
B.58143	B.50210 x B.34104	139 (nil)	123 (slight)	nil	mod.	102	112	116	115
B.58150	B.50215 x B.42231	142 (mod.)	95 (bad)	nil	heavy	110	106	178	92
B.58165	B.5142 x B.4098	90 (slight)	105 (mod.)	nil	light	103	102	80	112
B.58166	B.51311 x B.4098	102 (mod.)	101 (bad)	nil	heavy	104	102	121	99
B.58169	B.51129 x B.4098	94 (slight)	107 (mod.)	nil	mod.	103	104	64	98
B.58176	B.50214 x B.4098	91 (slight)	103 (mod.)	nil	light	100	100	101	110
B.58230	Trojan x B.4098	127 (slight)	92 (bad)	nil	light	103	103	150	94

See notes below Table III.

(g) Reaping Second Year Seedling Trials — B.57' Series — First Ratoons:

As a result of these trials (summarised in Table V) two further seedlings were selected, though for breeding only. It was also possible to recommend that two of the original selections be discarded on the basis of their ratoon performance.

TABLE V.

SECOND YEAR SEEDLING TRIALS — B.57' SERIES — FIRST RATOON CROP

GROUPS I — VII

Low Rainfall Station (L) ca. 40" — BELLE — Reaped 22—24 March, 1960

High Rainfall Station (H) ca. 55" — CLIFTON HALL — Reaped 17, 18 & 21 March, 1960

VARIETY	PARENTAGE	NO. OF CANES PER STOOL (ROTTEN)		ARROWING		H. R. BRIX		TONS CANE PER ACRE	
		L	H	L	H	L	H	L	H
B.41211	Standard	19 (0)	—	0	—	21.6	—	29.5	—
B.45151	Standard	—	20 (1)	—	2	—	21.1	—	51.7
B.4744	Standard	18 (1)	20 (1)	0	2	22.1	19.9	28.5	67.7
B.5712	B.3439 x B.45151	98 (slight)	91 (mod.)	nil	light	93	89	95	72
B.5731*	B.39254 x B. 0377	85 (slight)	—	nil	—	112	—	104	—
B.5736	B.4362 x B.39220	91 (slight)	84 (slight)	nil	mod.	105	105	97	75
B.5743	B.4362 x B.50340	87 (slight)	64 (bad)	nil	light	106	95	87	60
B.5744	„ x „	75 (slight)	77 (mod.)	nil	mod.	92	98	78	56
B.5745*	„ x „	84 (slight)	79 (bad)	nil	heavy	100	92	69	51
B.5787	B.45154 x B.49119	78 (slight)	94 (mod.)	nil	mod.	104	108	119	96
B.5789	„ x „	140 (slight)	131 (mod.)	nil	light	105	104	143	124
B.5791	„ x „	125 (slight)	142 (slight)	nil	mod.	108	109	176	125
B.57109*	B.49372 x B.45151	—	92 (slight)	nil	light	—	92	—	66
B.57124*	B.5037 x B.42231	—	46 (mod.)	nil	mod.	—	105	—	28
B.57133	B.5041 x B.4744	107 (slight)	92 (mod.)	nil	light	99	98	85	59
B.57138*	B.5061 x B.4098	—	84 (slight)	nil	light	—	97	—	59
B.57141	B.50196 x B.4098	95 (slight)	69 (mod.)	nil	light	98	99	93	65
B.57146	B.50370 x B.4098	106 (slight)	110 (slight)	nil	light	102	101	102	70
B.57150	B.51131 x B.4098	114 (slight)	83 (mod.)	nil	light	109	103	108	56
B.57156	B.51311 x B.4738	85 (slight)	75 (mod.)	nil	mod.	101	97	108	72
B.57176	P.R. 1000 x B.4098	101 (slight)	90 (mod.)	nil	heavy	103	101	119	66

* For breeding only.

For notes see below Table III.

Variety Testing

(a) Third Year Seedling Trials:

These trials are intended to screen the selections of each series more extensively, so that any which come up to the performance of the standard varieties may be considered for final testing in Select Seedling Trials and for commercial cultivation in Barbados. The layout of these trials takes the form of six randomised blocks, with a plot size of twenty cane holes, or approximately 1/87th of an acre. Sample bundles are taken from two of the six blocks for sucrose in juice determinations. This is the first stage at which mill data are recorded in the testing schedule.

(i) PLANT CANE TRIALS — B.56' SERIES

None of the varieties of this series was considered to be worthy of inclusion in Third Year Seedling Trials.

(ii) FIRST RATOONS — B.55' SERIES

Only one variety of the B.55' series gave yields of cane exceeding those given by the standard varieties and the juice of this was so poor that it cannot be considered for commercial cultivation. A summary of the performances of the varieties of the B.55' series is given in Table VI. The varieties of this series will not be tested further in Barbados.

TABLE VI.
THIRD YEAR SEEDLING TRIALS — B.55' SERIES
Means of Plant Cane and First Ratoon Crops

Plantation ...	Bushy Park	Oughterson	Boarded Hall	Henley
Soil Type (Turner)	Group II (a)	Group II (b)	Group IV (b)	Group II (c)
Reaping Dates ...	2/2/59 & 25/3/60	6/2/59 & 19/4/60	27/2/59 & 29/4/60	6/3/59 & 6/5/60
Annual Rainfall	ca. 56"	ca. 44"	ca. 52"	ca. 64"

TONS CANE PER ACRE

B.41211	32.76	—	—	—
B.4744	—	44.48	41.69	51.25
B.49119	37.22	43.39	45.95	54.18
B.55109	19.85	31.06	32.38	41.25
B.55137	24.66	33.03	32.75	42.55
B.55244	31.87	40.91	33.48	47.38
B.55258	33.74	55.78	42.94	54.15
B.55317	29.78	34.90	38.66	39.68
A.3	24.10	28.21	27.20	33.03
H.5	13.63	16.29	20.80	26.49

PER CENT SUCROSE IN JUICE (PURITY)

B.41211	17.6 (86)	—	—	—
B.4744	—	17.5 (87)	18.9 (91)	20.5 (93)
B.49119	19.7 (90)	19.1 (89)	19.5 (91)	19.0 (91)
B.55109	19.0 (90)	18.7 (89)	18.4 (90)	18.9 (92)
B.55137	19.0 (90)	18.8 (90)	18.2 (91)	18.3 (89)
B.55244	16.7 (84)	15.1 (78)	16.6 (86)	16.5 (86)
B.55258	17.2 (88)	15.6 (82)	15.1 (84)	15.5 (87)
B.55317	16.5 (84)	17.0 (85)	17.4 (87)	17.3 (86)
A.3	17.6 (88)	16.7 (85)	17.4 (88)	17.7 (89)
H.5	20.4 (91)	18.9 (89)	19.9 (91)	19.9 (91)

NUMBER OF ROTTEN CANES PER PLOT

B.41211	19	—	—	—
B.4744	—	16	16	15
B.49119	5	23	15	14
B.55109	19	35	18	14
B.55137	8	26	20	14
B.55244	5	20	27	15
B.55258	6	14	27	15
B.55317	7	16	18	17
A.3	7	23	16	15
H.5	7	36	17	12

(iii) **SECOND RATOONS — B.54' SERIES**

Third year trials of this series were concluded in 1960, and the average results for three crops are presented in Appendix IV.

In interpreting the results, several factors had to be considered:—

(i) the plant cane reaping season (1958) was very dry and put a premium on canes resistant to rotting and desiccation;

(ii) the first ratoon crop grew and ripened under good conditions;

(iii) after good rain in May, 1959, the second ratoon crop suffered severe drought from June to September, 1959, and again dry conditions set in in December, 1959; the ripening season was favourable;

(iv) in comparing new varieties with standards, it should be remembered that B.49119 shows exaggerated yields of cane in these small plot experiments.

The most interesting varieties are:—

B.53164 (B.43283 x B.41227) — a brownish-green cane which is almost self-trashing. The canes are medium-thick, semi-erect and tend to flower freely in the high rainfall areas. Its yield of cane is best in heavy soils, though not up to those of the standard varieties.

B.5401 (B.3439 x B.3337) — a medium-width clean erect red cane with a yellow root ring. This variety appears to ratoon well, and has an excellent juice. Its greatest defect appears to be the freeness with which it flowers, which limits its yields.

B.5480 (B.37172 x B.4098) — a pale yellow cane turning green with purple tinges where exposed to the sun. The canes are of medium-thickness and trash easily; heavy crops are recumbent, and the tops remain green well into the dry season. This variety gave heavy plant cane yields and moderate ratoon yields in these small plots, in all but the dry areas. Juice quality is very good.

B.54142 (B.44341 x B.3337) The canes of this variety are medium to thick recumbent, yellow, turning red-brown when exposed to sunlight. It has an excellent juice. The main defect of this variety is that it does not give a very heavy fall of trash. An interesting feature, and one which should easily distinguish it, is that the root primordia grow all the way round the bud forming an arch over it. As the bud is large, the root ring is also quite wide. This variety is expected to be grown commercially in Barbados.

B.54163 (B.4699 x P.O.J.2878) — a medium-width yellow cane turning green with brown splashes where exposed to sunlight. This variety has an exceptionally fine juice, but flowers too freely in Barbados to become a commercial variety.

B.54172 (B.47386 x B.4098) — a medium-width yellow cane turning green and eventually brown on exposure to sunlight. When ripe, the canes are splashed sparingly with brown spots, and in this respect it resembles B.52298. This variety gave heavy plant cane yields, but does not appear to ratoon well. It flowers profusely, particularly in the high rainfall areas.

B.54277 (B.44341 x B.3337) — a medium to thin pale yellow cane turning green where exposed to sunlight. There is a purple tinge on the leaf-sheath. This variety is an exceptionally vigorous ratooner in all trials, and the canes are mostly erect. The plant cane crop flowered fairly freely, but the ratoon crops flowered sparingly. The juice quality of this variety was satisfactory.

The two foreign varieties, H.37—1933 and NCo.310 were outclassed in tons cane per acre, largely on account of excessive flowering. The juice quality of NCo.310 is impressive.

(b) Select Seedling Trials:

In these trials, the layout is in the form of a 5 x 5 latin square, with a plot size of approximately 1/40th of an acre.

(i) FIRST RATOONS:

In the first ratoon trials, the varieties B.50112, B.5213, B.52107 and B.52298 were compared with the standard varieties B.45151, B.4744 and B.49119.

A summary of these trials is given in Table VII.

TABLE VII.
SELECT SEEDLING TRIALS — FIRST RATOONS

Plantation Soil Type (Turner) Reaping Date – 1st R. Rainfall p.a.	Foursquare			Bulkeley			Portland			Hothersal		
	II (b)			IV (b)			II (c)			II (c)		
	28th April, 1960 ca. 45"			3rd May, 1960 ca. 54"			4th April, 1960 ca. 50"			9th May, 1960 ca. 64"		
	TONS CANE PER ACRE											
	Plant Canes	1st Rtns.	Mean	Plant Canes	1st Rtns.	Mean	Plant Canes	1st Rtns.	Mean	Plant Canes	1st Rtns.	Mean
B.45151	—	—	—	—	—	—	48.70	33.22	40.96	47.09	30.24	38.67
B.4744	50.43	26.12	38.28	38.97	29.10	34.08	50.44	34.77	42.61	51.83	44.21	48.02
B.49119	42.63	29.12	35.87	39.98	30.57	35.13	—	—	—	—	—	—
B.50112	42.84	26.49	34.67	39.77	30.25	35.03	43.55	29.60	36.58	44.06	38.72	41.39
B.5213	42.29	31.24	36.77	31.45	24.80	28.13	—	—	—	—	—	—
B.52107	—	—	—	—	—	—	43.07	35.08	39.08	54.64	46.62	50.68
B.52298	47.65	30.55	39.10	36.50	28.01	32.26	53.55	32.49	43.02	53.18	42.69	47.94
	PERCENT SUCROSE IN CANE											
B.45151	—	—	—	—	—	—	16.0	17.6	16.8	15.2	16.4	15.8
B.4744	15.5	15.6	15.6	15.5	16.3	15.9	15.4	16.4	15.9	14.3	16.9	15.6
B.49119	16.3	15.0	15.7	15.9	16.2	16.1	—	—	—	—	—	—
B.50112	15.5	14.4	15.0	15.5	15.9	15.7	16.1	16.3	16.2	14.3	16.3	15.3
B.5213	14.5	14.9	14.7	14.1	15.3	14.7	—	—	—	—	—	—
B.52107	—	—	—	—	—	—	15.1	16.4	15.8	14.3	17.1	15.7
B.52298	13.9	13.2	13.6	15.3	15.2	15.3	15.4	16.6	16.0	13.7	16.2	15.0
	TONS SUGAR PER ACRE											
B.45151	—	—	—	—	—	—	7.44	5.53	6.49	6.66	4.48	5.57
B.4744	7.08	3.49	5.29	5.50	4.19	4.85	7.20	5.05	6.13	6.72	6.70	6.71
B.49119	6.34	3.68	5.01	5.77	4.38	5.08	—	—	—	—	—	—
B.50112	5.98	3.12	4.55	5.57	4.21	4.89	6.56	4.20	5.38	5.66	5.66	5.66
B.5213	5.51	3.91	4.71	3.94	3.38	3.66	—	—	—	—	—	—
B.52107	—	—	—	—	—	—	6.06	5.13	5.60	7.09	7.15	7.12
B.52298	5.37	3.00	4.19	4.90	3.53	4.22	7.51	4.82	6.17	6.58	6.02	6.30
	NUMBER OF ROTTEN CANES PER PLOT											
B.45151	—	—	—	—	—	—	21	8	15	51*	142*	97
B.4744	60*	37	49	60*	25	43	25	7	16	36	21	29
B.49119	50*	18	34	80*	8	44	—	—	—	—	—	—
B.50112	59*	26	43	78*	20	49	29	7	18	47*	27	37
B.5213	86*	51	69	79*	17	48	—	—	—	—	—	—
B.52107	—	—	—	—	—	—	54*	8	31	25	22	24
B.52298	75*	15	45	65*	18	42	36	10	23	42	19	31
LSD (P =												
0.05) Cane	±4.93	±2.44	±3.30			±3.36	±5.48	Insig:	±2.90			±2.94
Sugar	±0.58	±0.17	±0.46			±0.39	±0.91	±0.76	±0.72			±0.61

*Damaged by rats.

The trial in the low rainfall area was burnt and could not be reaped.

In the intermediate rainfall area, part of the field at Hanson in which one of these trials was situated was burnt, and as there was a relatively large number of supplies in this trial, it was decided to abandon it. At Foursquare B.5213 gave the heaviest yield of ratoon cane followed by B.52298. B.5213 also gave the heaviest yield of ratoon sugar, but B.52298 was outyielded by both of the standard varieties and B.50112. Taking the mean yields over the two crops, B.52298 has outyielded the standards on cane, but all of the new varieties have been outclassed by the standards on sugar.

On the Valley soils, there was little to choose between the standard varieties and B.50112 on cane and sugar. However, B.50112 proved to be difficult to cut and clean. Taking the mean yields over the two crops, B.49119 has given the heaviest yield of cane and sugar, very closely followed by B.50112 and B.4744. The other two varieties were outclassed.

In the high rainfall areas, B.52107 gave the heaviest yields of ratoon cane, but was beaten on sugar at Portland by B.45151. Over the two crops, it was beaten by the two standard varieties and B.52298, mainly because the plant crop was badly damaged by rats. At Hothersal, B.52107 was outstanding, outyielding all other varieties tried on cane and sugar. It is true that B.45151 suffered severe rat damage in the ratoon crop, but B.4744 did not, and this variety was well beaten by B.52107.

From the results of these trials, it would appear that B.52107 is the only variety with commercial possibilities, and this variety will be planted in further Select Seedling Trials along with promising varieties of the B.54' Series. It is a very thick, low fibre, cane which drops its trash readily and has quite a good juice.

Research Work

I. The Inbreeding Programme:

Twenty-seven selfings were made during the 1959 breeding season. These included selected members of the inbred lines, up to and including the fifth generation of selfing, as well as new selfings of the Barbados varieties B.39220, B.42231 and B.4744, and of the foreign varieties Co.421 and Eros. Germinations were variable, but were satisfactorily high in the late-generation selfings.

Selections from the selfs in the nursery were planted directly in the breeding plots at Groves, where under normal spacing and good rainfall conditions they could be judged as to suitability for further selfing, inter-line crossing, or direct crossing with standard breeding varieties. Juice brix determinations, made in the plots each year in March, are consulted in assessing the potential breeding value of the selfs.

Commercial testing of selections from the early inbred-crosses and top-crosses was continued. Several of the B.58' series yielded well in Second Year Trials under drought conditions, and some from later crosses in the B.59' and B.60' series were allocated to Second Year Trials to be reaped in 1961 and 1962. No seedling from these breeding lines has yet been reaped in Third Year Trials.

Data from the first series of inbred-crosses and top-crosses to pass through the Second Year Trial stage were compared with those for corresponding outcross seedlings. Juice qualities were, generally speaking, very good, while cane weights were variable. Rejections were made always on account of low weight. As they were only for a few seedlings of one year's series, the results require confirmation over a number of years. However, for what they are worth, they fit into the expected pattern for such a breeding system, whose aim is to improve selection percentages by ensuring better population juice qualities. These latter are secured by the use of inbred males approaching homozygosity for high juice brix — a polygenic character, probably controlled by simple dominance. Selection for yield must remain the important criterion in such populations, since this is unlikely to be controlled by a simple dominance system. Variability in yield characters may not, in fact, be markedly reduced by such a breeding system, and although some increase in the percentage of seedlings worthy of commercial testing should result, female parents markedly prepotent for high yield characters would be necessary for this increase to be a remarkable one. The search for such prepotent female parents is a major objective of the progeny testing work.

Results of the Barbados work are substantially in agreement with those reported by Daniels from Fiji (Proc. 10th Congress Int. Soc. Sugar Cane Tech. Hawaii 1959). It is most unfortunate that the selfing programme in Fiji was brought to a conclusion by the impossibility of selection for both high sucrose and downy mildew disease resistance in selfed populations of manageable size. Happily, Barbados has no major disease problem, so that the high sucrose selfed lines can be continued without any such restriction.

The importance of selection in association with the inbreeding programme should be emphasized. Daniels (*loc. cit.*) is correct in pointing out that the uncritical use of inbrds for no other reason than that they are inbreds, is dangerous. From Hawaii, Mangelsdorf (*loc. cit.*) reports that populations grown from crosses between selfs, as well as those from crosses between a self and another breeding cane, appeared, on the whole, to be as attractive as the populations from crosses among the more heterozygous breeding canes. Though still holding the view that the recurrent crossing programme is more efficient than the selfing-crossing programme as a means of producing commercial varieties, Mangelsdorf admits that the evidence can hardly be regarded as conclusive, and is of the view that a re-examination of the issue is to be encouraged.

Several high-brix inbreds of attractive growth-type, which were required for breeding but had been non-arrowing hitherto, were grouped together in a special early-planted plot. Some arrowed for the first time as a result of this treatment, and will be used in the 1960—61 season.

First-generation selfs from B.34104 (H. series) are exceptionally high in brix. Unfortunately these have been predominantly non-flowering, but some have been induced to flower by early planting, and will be used in breeding. The first-generation J series, from B.4362, which were also high-brix individuals, gave almost exclusively *spontaneum* - like derivatives on further selfing, as noted in previous Annual Reports. However, a few individuals of reasonable appearance and with high brix have been selected to continue the inbred lines.

All inbred lines from the Q and S series, from B.41242 (a Kassoer nobilisation) and B.4454 (a *robustum* hybrid) respectively, were abandoned some time ago on account of the absence of any individuals with satisfactory juice quality in the selfed populations. In the U lines, from B.37161 by an original sib-cross, disappointingly few derivatives have shown good brix means, though a few are satisfactory, and it is hoped that further selfing will fix the juice quality, since the lines are of attractive growth-type.

II. Laboratory Work:

Investigations in the laboratory were somewhat curtailed by the absence of the Senior Geneticist on vacation leave from June to September, 1960. Cytological studies were again concerned mainly with establishing the chromosome numbers in the selfed series. Determinations for individuals in the fifth selfed generations in the B and C series showed that even at this stage meiosis is still somewhat irregular, and the selfs may show chromosome numbers different from those of the previous generation. The numbers for sibs may also differ. These facts tend to corroborate the observed morphological characters of selfs in the different lines, and the conclusions from theoretical considerations — namely that homozygosity is achieved far more slowly by successive generations of selfing in aneuploid interspecific varieties than it is in regular polyploids (such as the noble cane varieties or *Saccharum spontaneum* types) which behave in many ways like diploids, or in true simple diploids such as maize.

Sugar cane material is difficult to prepare for cytological examination. The chromosomes are small and numerous, the root-tips are not easily susceptible to the squash methods favoured by laboratory workers today, and the meiotic stages are unreliable because of the virtual impossibility of distinguishing precisely the univalents from the bivalent and multivalent configurations.

Other laboratory work included morphological examination of new sugar cane varieties likely to be grown commercially, and the preparation of coloured illustrations depicting the details of internode shape and bud characteristics. Such illustrations have been proved useful for variety identification on several occasions.

III. Hawaiian Solutions:

Using vegetative canes of a similar age to arrowed canes, several factors in solution crossing were studied in an experiment early in 1960. Management of this was similar to that used previously — solutions were changed twice weekly, and an internode cut off each cane once weekly. This experiment showed:—

- (i) under our conditions the dilute solution deteriorated very rapidly — (Table VIII).

TABLE VIII

SO₂ CONCENTRATION (PPM) OF DILUTE SOLUTIONS CONTAINED IN CANS 20 LITRES CAPACITY. AVERAGES OF 2 OR 3 TESTS

AT MIXING	2 — 3 HOURS LATER	3 — 4 DAYS LATER		
	O Canes Per Can	O Canes	4 Canes	15 Canes
150 (+ 85 ppm H ₃ PO ₄) ...	86	5	10	16
150 (+ 120 " ") ...	91	4	7	9
80 (+ 50 " ") ...	32	2	7	9
80 (+ 75 " ") ...	46	5	9	10

- (ii) After 4 weeks in solution toxic symptoms were rather more marked in canes in the 150 ppm solutions than in the 80 ppm solutions.
- (iii) Painting the canes with "Geon" latex at the commencement of the experiment reduced toxic symptoms.

If we adopt a lower initial concentration, a similar reduction to 5—10% of this value after 3 or 4 days would necessitate more frequent changing (three times per week would be feasible) since reducing conditions must be maintained if the vascular system of the cane is to remain active. Precautions against this rapid deterioration which we could consider are:—

- (i) Better chemical stabilising, either with an increased proportion of phosphoric acid, or by the addition of other more efficient stabilisers.
- (ii) Protection of the cans from sunlight (sulphite oxidation is a photo-chemical reaction), high temperatures and windflow at the solution surface.
- (iii) Reduced aeration of the dilution water.

It seems likely that with a more stable formulation initial concentrations could be reduced still further, to the benefit of the canes, compatible with not more than three solution changes per week.

SO₂ uptake can be reduced by a latex film applied to the canes and leaf sheaths. On a small scale this could be used as a treatment for the female parents.

So long as solutions are maintained sufficiently fresh, there should be no need to cut off internodes during the crossing period.

IV. Competition in Bunches:

Recognizable clones of known vigour have been used in a study of bunch competition on the lines of Yang (1957). Varieties of similar type were compared in any one bunch, as would be found in seedlings of one family, but were deliberately chosen to include some of fast early growth and others of slower growth (based on observation elsewhere). Single eye cuttings were potted up in twos or fives in the same manner as seedlings, and germination checked at the time of planting in the field to ensure that every bunch contained a shoot of each competitor at the outset. Measurements were taken in December 1959, seven months after planting, i.e. a little later than the normal nursery selection. Some results are shown in Table IX.

TABLE IX

EXPERIMENT	VARIETY	CLASSIFICATION	Survival %	Inches of cane per stool	Cane number per stool	No. of comparisons
1 Noble	Ba.11569	Slow	78	59	1.1	14*
	Comus	Fast	100	129	2.8	
2 Thick	J.1	Slow	91	156	3.7	9*
	B.42231	Fast	91	140	2.4	
3 Commercial	B.4738	Slow	93	77	1.3	11*
	B.49119	Fast	90	251	3.6	
4 Commercial	B.37161	Slow	78	74	1.1	9†
	B.41211	Slow	100	115	2.2	
	B.41227	Fast	33	53	1.0	
	B.4744	Fast	100	107	1.8	
	B.49119	Fast	89	123	1.9	
5 Thin	B.39246	Slow	88	191	2.8	16†
	J.2	Fast	63	104	1.6	
	C.P.28/11	Fast	94	127	1.3	
	B.39274	Fast	81	70	1.2	
	B.44237	Fast	100	321	4.6	
6 Thick	B.40123	Slow	39	56	1.4	18†
	C.38	Fast	100	56	1.2	
	C.P.44—101	Fast	100	154	2.4	
	B.4942	Fast	83	147	2.3	
	B.5121	Fast	83	165	2.2	

*Measurements apply only to stools containing both competitors in December.

†Measurements apply only to stools containing 4 or 5 competitors in December.

In experiments 1, 3 and 6 the results agreed with a hypothesis that successful competition would be the result of fast early growth, but this was apparently not an adequate explanation for the varieties in experiments 2, 4 and 5. In all cases bunch planting would hinder reliable selection since the differences in competitive ability are not a good guide to true performance. Thus B.49119 would be preferred to B.4738 on the basis of cane number and length, even though we know that both would be worthy of further trial beyond the nursery stage. Similarly B.41227 would almost certainly remain unselected.

There are no direct comparisons between bunches and singles in these experiments, and some new statistically-designed trials comparing seedling with clones, singles with bunches, and different types of single-eye cutting, are being grown alongside the 1960 nursery. Further conclusions will be forthcoming from these, but at present the indications are that bunch planting is not an aid to selection. It should be noted that the originators of the bunch-planting method only suggested it as an expedient to house more seedlings in a given area; the suggestion that natural selection in bunches is advantageous has come from various secondary users, though it is widely assumed that selections from bunches will contain the best of the population.

Reference. YANG, C. S. Ann. Rep. Taiwan Sug. Expt. Sta. 16 (1957) 37—48.

V. Survival of Singles and Bunches, and the Interpretation of Selection Percentage Figures:

(i) *Survival in pots.* A thorough census in 20 families of B.61' Series (1959 potting and nursery), in which both singles and bunches of five seedlings were

potted, has been kept. Shortly before planting out the field nursery a careful count of surviving seedlings in each bunch was made. The results are shown below:—

	SINGLES	BUNCHES
Potted	8,157	3,719
Planted in nursery	6,961	3,506
Proportion dead	.147	.057
Proportion dead bunches expected from singles ...	$= (.147)^5 = .000069$	
Observed live seedlings per live bunch at time of field planting	$= 2.76$	
Proportion of seedlings-in-bunches dead	$= 1 - \frac{2.76}{5} = .448$	
Expected proportion of seedlings-in-bunches dead based on death rate of whole bunches	$= 1.000 - \left(\sqrt[5]{.057} \right) = .437$	

Clearly whole bunches die greatly in excess of an expectation based on singles. The death rate in fact gives an estimate of 2.82 seedling surviving per bunch, which agrees closely with the 2.76 actually counted. Seedlings-in-bunches die as a result of bad handling, and possibly competition, giving a death rate per seedling some three times as great as the singles.

For this reason the potting of bunches has been discontinued, any excess seedlings being left in the boxes until the field planting, when the 'turves' can be roughly divided into bunches and planted direct into the field.

(ii) *Survival in field.* A slightly larger sample of the same 20 families gave the following figures:—

	SINGLES	BUNCHES
Planted	7,423	3,506
Surviving at time of selection	6,717	3,332
Proportion dead	.095	.050
Proportion dead bunches expected from singles ...	$= (.095)^{2.76} = .006046$	
Recognizable live seedlings per live bunch at time of selection	$= 1.31$	
Proportion of seedling-in-bunches dead since potting ...	$= 1 - \frac{1.31}{5} = .738$	
Portion of seedlings-in-bunches dead since planting in field ...	$= 1 - \frac{1.31}{2.76} = .525$	
Expected proportion of seedlings-in-bunches dead based on death rate of whole bunches since planting ...	$= 1.000 - \sqrt[2.76]{.050} = .663$	

After planting in the field, further death of singles and whole bunches occurs, largely by failure to establish. Whole bunches again die in excess of expectation. Only 1.31 seedlings per bunch could be recognized in the remainder, but it is likely that the true survival was rather higher than this, since in uniform families separate seedlings are difficult to distinguish. 2.76 seedlings per bunch planted is similarly a slight underestimate, i.e. approximately half the seedlings planted in bunches in

fact die. This does not agree closely with an estimate based on the death of whole bunches, since whole bunches die not only as a result of cumulative death of component seedlings, as appeared to be the case in the pot stage.

(iii) *Management of the nursery.* A limited amount of organic manure was available for this nursery. Only half the field could be treated, and it was arranged that half of each family was manured in order not to bias family comparisons. There is a marked response to such manuring on the thin soils at Codrington. In 26 families examined survival of stools after planting in manured rows was 93% compared with 90% in unmanured rows. Recognizable seedlings per bunch were about the same in both treatments. Unfortunately no figures on the number of selections made in each treatment were collected but it is known that, with the better growth under manured conditions, the selection percentage was higher, in spite of conscious effort to keep the selection percentage more or less constant throughout by raising or lowering standards. Under non-manured conditions some families were so uniformly poor that most stools of 5 month of age had insufficient cane to replant. This clearly indicates that good growth conditions are essential for the expression of seedling variability and that a clone would be a useful guide under present conditions at Codrington.

(iv) Selection percentages can clearly be misleading if survival in the field is not checked. All past records of the Station's nurseries show only the number planted, and this constitutes a limitation in interpreting past records, particularly with bunches. Among the 20 families examined in the B.61' series, for example, field survival varied as follows:—

<i>Singles</i>	<i>Whole Bunches</i>	<i>Seedlings in Bunches</i>
66% — 99%	80% — 100%	33% — 72%

For selection purposes, seedlings in bunches which are unrecognizable have to be considered dead even if they are present. The survival observed cannot be considered absolutely accurate from this point of view. Calculating the selection percentages on alternative bases gave the results shown in Table X. As can be seen the order of merit based on singles is more or less the same, but if 5 seedlings per bunch are assumed, or even if pot deaths are allowed for, the results can be very misleading. When compared on a 'per-live-seedling' basis, selection in bunches is seen to compare very closely with selection in singles with a few exceptions. In some families, the selection percentage among surviving seedlings in bunches is markedly higher than that in corresponding singles. So long as the survival within these bunches is low, natural selection among competitors in the bunch *might* account for the improved standard in bunches. Whether or not there is truly an improved standard will be tested by comparisons in the first and second year trials of these families.

TABLE X

SELECTION PERCENTAGES PER SEEDLING IN 26 FAMILIES FROM THE
B.61' SERIES NURSERY

FAMILY	BASED ON NUMBER PLANTED			Based on number surviving and recognizable	
	Singles	B U N C H E S		Singles	Bunches
		Without pot Check	After pot Check		
348	10.4	5.4	—	11.7	24.5
336	12.2	3.2	—	12.6	11.4
12	12.5	2.1	3.7	12.7	8.6
216	12.3	1.4	2.8	13.8	5.2
26	11.3	2.7	4.7	14.0	11.2
8	12.3	2.8	—	14.4	12.7
2	13.8	3.8	5.7	14.6	15.3
86	12.9	5.6	16.1	14.7	28.0
47	14.6	3.9	7.7	14.8	14.4
70	14.4	6.5	10.3	15.1	18.8
11	13.2	2.0	3.2	15.8	8.5
84	13.0	3.0	4.7	15.9	12.2
76	15.0	3.5	7.0	16.3	12.8
48	11.5	4.0	7.8	17.5	17.5
24	17.1	3.0	6.0	17.6	13.2
13	16.8	3.7	6.6	18.8	14.9
325	17.0	4.6	9.5	18.8	15.2
14	18.7	4.9	9.8	19.4	22.2
352	16.9	4.3	9.7	20.5	13.4
395	16.0	4.7	7.7	21.3	20.8
43	25.3	5.1	8.2	26.5	18.4
6	30.1	3.1	8.4	32.7	25.4
405	30.9	8.3	—	33.5	30.7
106	28.8	5.9	—	34.5	24.3
85	38.6	8.1	17.9	41.7	41.1
406	36.9	14.2	—	46.8	52.5

In Figure I the selection from bunches (compared with singles) based on recognizable seedlings, is related to the overall survival of seedlings, in bunches (again compared with singles) since potting. There is no significant regression fitting all families. In only 6 families is any real improvement in standard as a result of bunch planting likely — these are those having a selection percentage higher than singles and at the same time a survival per seedling less than half that of singles. Selections from these 6 families will be compared closely with the remainder in subsequent trials.

In the B.62' series, 6 large families have been recorded in detail both for seedling per bunch and tillers per single. Separate classes have been randomised in the nursery, and selections from them will be randomised in the first year trial.

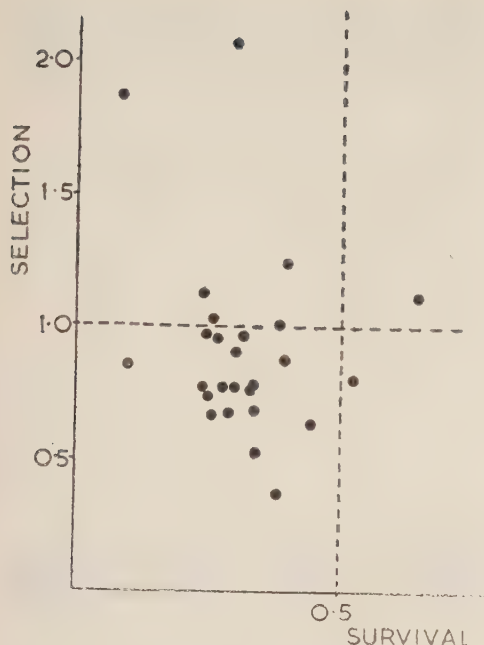


FIGURE I.

Selection from bunches, based on number of recognizable seedlings in bunches, compared with overall survival of seedlings in bunches from the time of potting. Both figures are divided by the corresponding figure for singles to put all families on a common scale.

VI. Topcross for Genetical Observation:

In May 1958, seedlings of six crosses with B.49119 as a common male, and B.49119 selfed, were planted out as a replicated experiment with plots of the parent varieties grown from single-eye cuttings. These were recorded in February 1959, and again as ratoons in February 1960.

The genetic situation in this set of crosses is unique and of no particular interest, but the results show that such a layout could be useful in distinguishing several types of variation in, say, a set of new breeding canes crossed on to a standard tester variety. If it is assumed that the family means are unaffected by any cytological irregularities which may have occurred, B.49119 can be interpreted as having intermediate dominance for cane number and brix, the seedling progeny means approximating to the mid-parent values. In weight, thickness and length B.49119 appears recessive to the six female parents, and its self showed marked inbreeding depression for these three characters.

The relative value of each component of yield as a selection criterion at this stage depends on the heritability. If environmental variation is affecting parents and progeny in a similar manner, solutions for environmental and genetic components of within-plot variances can be obtained. Owing to excessive variation in plots of the recurrent parent, mid-parent values for environmental variance were so high that solutions for genetic variance were negative in some cases. Over the seven clones and seven families, however, the average values shown in Table XI were obtained.

TABLE XI.
ENVIRONMENTAL AND GENETIC VARIANCES OBTAINED FROM B.49119
TOPCROSS

CHARACTER				COMPONENT OF WITHIN-PLOT VARIANCE	
				ENVIRONMENTAL	GENETIC
Weight	— Plant Cane	...	...	14.89	1.60
	— Ratoon	...	...	12.02	9.07
Cane number	— Plant Cane	...	...	3.03	6.97
	— Ratoon	...	...	5.48	7.56
Brix	— Ratoon	...	...	1.30	0.87
Cane thickness	— Plant Cane	...	...	0.22	0.22
Cane length	— Plant Cane	...	...	0.21	0.19

Clonal variation is high in all characters. In plant canes, cane number would have been the most reliable criterion for selection, genetic variation being more than twice the environmental variation. Selection for weight would have been more efficient in ratoons than plant cane though even here the genetic component is smaller than the environmental.

Selection for brix would not have been very efficient because variances are low: this is probably because all canes were tending towards full ripeness, and had reached a uniformly high figure (overall mean 21.6). To detect maximum differences in brix selection would have to be made earlier than 12 months under the dry conditions of the experiment.

VII. Hot water treatment:

Six latin square trials comparing heat-treated stocks and untreated stocks were reaped as plant canes in 1960.

TABLE XII.
GAINS OR LOSSES ASSOCIATED WITH HEAT-TREATMENT IN
TONS CANE PER ACRE

Estate	B.37161	B.41211	B.45151	B.4744	B.49119
Belle ...	loss 2.3	—	—	loss 0.7	loss 1.1
Husbands ...	loss 3.8	gain 0.7	—	—	gain 1.5
Bennetts ...	gain 1.4	—	gain 2.3	—	gain 1.0
Orange Hill ...	nil	—	loss 5.1	loss 0.1	—
Hannays ...	gain 4.1	gain 3.2	—	—	loss 0.2
Cottage ...	loss 2.3	—	loss 1.2	gain 2.4	—
Average gain ...	2.8	2.0	2.3	2.4	1.3
Average loss ...	2.8	nil	3.2	0.4	0.7

The only significant difference in yield was that at Hannays — an increase in heat-treated stocks. The overall results are therefore not instructive, though

B.41211 is consistent in showing slight superiority of heat-treated material. In normal years, heat-treated stocks have flowered more freely with an associated *reduction of yield in plant canes*; the present experiments received lower rainfall in 1959 and arrowing was more or less completely suppressed. This may account for the lack of significant differences in either direction.

TABLE XIII.

GAINS OR LOSSES ASSOCIATED WITH HEAT-TREATMENT IN
TONS SUGAR PER ACRE

Estate	B.37161	B.41211	B.45151	B.4744	B.49119
Belle ...	loss 0.32	—	—	gain 0.14	loss 0.29
Husbands ...	loss 0.74	gain 0.12	—	—	gain 0.19
Bennetts ...	gain 0.14	—	gain 0.35	—	loss 0.31
Orange Hill ...	loss 0.12	—	loss 0.93	loss 0.11	—
Hannays ...	gain 0.46	gain 0.31	—	—	gain 0.01
Cottage ...	loss 0.30	—	loss 0.12	gain 0.08	—
Average gain ...	0.30	0.22	0.35	0.11	0.10
Average loss ...	0.37	nil	0.53	0.11	0.30

Heat-treated stocks generally showed a slightly inferior juice quality, so that the resulting sugar per acre figures tend to favour untreated stocks. A tendency to produce more late shoots may be responsible for this drop in juice quality.

There are so far no startling differences in any of these trials, and we can say that plant cane yields seemed unaffected except possibly in the case of B.41211. Certainly there is no evidence of the large differences associated with ratoon stunting disease which have been observed in other countries, notably Louisiana and Australia. Differences may appear in ratoons, and we hope to run each of these trials to as late a ratoon as possible. More information on tillering habit differences is being sought with freshly heated material.

'Symptoms' are generally hard to find, and we have been unable so far to organise an inoculation experiment on the lines of those in Jamaica (Smith & Manser — J.A.S.T. Journal, Vol. 21 (1958) 23—28).

VIII. Borer infestation:

The Geneticist assisted the Government Entomologist in some detailed tests of moth borer damage in different varieties. It was established that date of infestation affected the extent of losses in sucrose per cent cane, and since this was often a characteristic of field rather than varieties, variety differences could not be demonstrated. Early attack was of less consequence than late: infestation in the upper half of the cane causes more damage than a similar infestation in the lower half.

Joint infestation in its conventional form (percentage of joints bored) is not a precise measure of borer population when varieties of different growth are considered. Variety differences measured by per cent joint infestation are fallacious. No variety differences in numbers of joints bored have been demonstrated statistically. True variety resistance to borer is probably very rare, but resistance to secondary rotting is an important selection criterion in Barbados.

The whole question of borer susceptibility and its measurement will be discussed in a paper elsewhere.

Varietal Trends in Contributing Territories

Jamaica:

Variety percentages for the 1959 and 1960 crops are given below. It will be seen that there have been further small increases in the three major varieties, but the overall picture remains almost unchanged, with B.41227 and B.4362 representing more than 70% of the area reaped.

			1959	1960
B. 41227	...	...	38	39
B.4362	...	...	30	32
B. 42231	...	...	10	11
B.37172	...	...	5	3
Co.331	...	...	3	3
B.34104	...	...	3	2
B.3439	...	...	3	2

British Guiana:

The only significant change has been an appreciable increase in the proportion of B.41227 reaped, mainly at the expense of B.37161. These two varieties account for more than 78% of the area reaped. The variety percentage figures for 1959 and 1960 were:—

			1959	1960
B.41227	...	...	38.2	41.9
B.37161	...	...	39.0	36.3
B.47258	...	...	7.3	7.6
B.47225	...	...	4.3	3.9
Pindar	...	...	2.4	2.0
B.4362	...	...	2.1	2.0

Barbados:

Figures for the 1960 and 1961 crops reveal a remarkable increase in the percentage of B.49119, which is now the mainstay of the low-rainfall districts. The other recent varieties B.4744 and B.45151 also increased in acreage reaped. These increases were at the expense of the older favourites, B.41211, B.37161 and B.4098, as shown below:—

			1960	1961
B.4744	...	...	25.29	26.79
B.41211	...	...	25.78	23.01
B.49119	...	...	15.48	20.74
B.45151	...	...	18.03	20.27
B.37161	...	...	7.99	3.30
B.4098	...	...	2.49	1.26

St. Kitts:

The trend is towards a reduction in the two major varieties, B.37161 and B.41211, accompanied by an increase in the newer varieties B.49119, B.45151 and B.47419. St. Kitts is the only territory which grows the latter on an appreciable scale.

Variety per cent acreages are set out below:—

			1960	1961
B.41211	...	...	51.4	49.84
B.37161	...	...	18.2	13.00
B.45151	...	...	8.7	10.60
B.47419	...	...	5.4	8.19
B.49119	...	...	4.3	7.39

Antigua:

The new commercial variety B.49119 has given very promising results in Antigua, and has already reached the status of leading variety in the territory. The old favourite B.4098 now occupies less than 25% of the reaped area.

Figures for the 1961 crop, and those of 1959 to show the extent of the change-over, are presented below:—

			1959	1961
B.49119	...	...	16.6	49.2
B.4098	...	...	73.5	24.3
B.4744	...	...	4.4	6.0
Mixed	...	...	—	15.5

Trinidad:

The most notable change has been a considerable increase in the area under B.41227, mainly at the expense of B.3337 and B.37172. There was also an increase in the area under B.37161.

			1959	1960
B.41227	...	...	24.9	37.2
B.37172	...	...	21.6	17.8
B.3337	...	...	24.5	17.2
B.37161	...	...	10.3	14.4

Barbados Varieties in some Foreign Contributing Territories

Central Romana, Dominican Republic:

The Corporation has about 130,000 acres under cane, of which nearly 70% is in Barbados varieties. The old Javan variety P.O.J.2878, which dominated the area for many years, is being replaced rapidly, as shown by the following figures for variety percentages:—

			1959—60 crop	present area
P.O.J.2878	...	...	41.0	27.8
B.4362	...	...	14.7	23.5
B.43337	...	...	17.6	21.9
B.41227	...	...	16.5	21.0
B.37161	...	...	5.7	2.5
Others	...	...	4.5	3.3
			100.0	100.0

Martinique:

Of the total of more than 34,500 acres in cane, approximately 79% is at present in Barbados varieties. The trend is indicated by the following tables of variety percentages:—

			1959	1960
B.37172	...	...	20.0	22.0
B.37161	...	...	19.5	22.0
B.4098	...	...	15.5	15.0
B.34104	...	...	16.0	12.0
B.4362	...	...	5.0	4.0
B.41227	...	...	2.0	3.0

Costa Rica:

The total acreage harvested is now almost 78,000, of which about 40% is already occupied by Barbados varieties. The steady increase of these over the past three seasons, and the decline in the previously dominant variety P.O.J.2878, are shown in the following table of variety percentages:—

			1958	1959	1960
P.O.J.2878	...	...	60	55	45
B.4362	...	...	20	25	30
B.37161	...	...	3	4	5
B.37172	...	...	0	1	3
B.41227	...	...	0	1	2

St. Croix, U.S. Virgin Islands:

The total acreage under cane is about 6,000, and of this all but an insignificant proportion is under Barbados varieties. The trend is shown by the following variety per cent acreages for 1956, 1958 and 1960:—

			1956	1958	1960
B.37161	...	...	79.6	85.1	84.4
B.4098	...	...	0.2	3.6	2.7
B.49119	...	...	0.0	0.0	2.7
B.45151	...	...	0.0	0.0	0.4

Distribution of Varieties to Contributing and Other Countries

In October 1959, selected consignments of the B.57' series were sent to those contributing countries for which they were selected. The varieties and countries to which they were sent are given below:—

**Trinidad, Antigua
and St. Kitts:** ... B.5712, B.5736, B.5743, B.5744, B.5745, B.5787, B.5789, B.5791,
B.57133, B.57138, B.57141, B.57146, B.57150, B.57156 and
B.57176.

Martinique: ... B.5712, B.5736, B.5743, B.5744, B.5745, B.5787, B.5789, B.5791,
B.57133, B.57138, B.57141, B.57146, B.57150, B.57156, B.57176,
B.42231 and 28NG.13.

Guadeloupe: ... B.5712, B.5736, B.5743, B.5744, B.5745, B.5787, B.5789, B.5791,
B.57133, B.57138, B.57141, B.57146, B.57150, B.57156, B.57176
and B.5686.

Jamaica:

One cutting of each of the 259 varieties of the B.59' series with the exception of B.5901—
B.5911, B.5913—B.5920, B.5974, B.5990, B.59140—B.59146, B.59240, B.59252 and B.59253.

In addition to the above, "fuzz" of 277 crosses was sent to Jamaica.

British Guiana:

One cutting of each of the 259 varieties of the B.59' series with the exception of B.5901—
B.5911, B.5913—B.5920, B.5974, B.5990, B.59140—B.59146, B.59240, B.59252 and B.59253.

B.35218, B.37161 (heat treated), B.5712, B.5712, B.5736, B.5743,
B.5744, B.5745, B.5787, B.5789, B.5791, B.57133, B.57138,
B.57141, B.57146, B.57150, B.57156 and B.57176.

In addition to the above, "fuzz" of 287 crosses was sent to British Guiana.

Central Romana, (Dominican Republic):

One cutting of each of the 259 varieties of the B.59' series with the exception of B.5901—
B.5911, B.5913—B.5920, B.5974, B.5990, B.59140—B.59146, B.59240, B.59252 and B.59253.

28NG.13, Ba.11569, B.3365, B.34102, B.35207, B.39254, B.4145,
B.42304, B.43349, B.45237, B.45301, B.46136, B.4733, B.48177
and B.50151.

In addition to the above, "fuzz" of 268 crosses was sent to Central Romana.

Costa Rica: ... B.45151, B.4744 and B.49119.

Panama: ... B.5401 and B.54277.

St. Croix: ... B.5401, B.5480, B.54142 and B.54277.

Australia: ... Ba.11569, B.34104, B.37172, B.39246, B.40105, B.42231, B.4373,
B.41227, B.45137 and B.47312.

Ghana: ... B.34104, B.37161, B.4362 and B.45151.

Nigeria: ... B.37172, B.41227, B.42231, B.4362, B.45137, B.45151, B.46364,
B.4744, B.47258, B.49119, Pindar and Ragnar.

Congo: ... B.34104, B.41211, B.41227, B.4362, B.47225, B.47258 and
B.49119.

U.S.A.: ... B.46364, B.40105 and J.1.

APPENDIX I.

SUGAR CANE BREEDING, SEEDLING RAISING AND FIELD NURSERY PLANTING 1959—60 — B.62' SERIES

Details of Crosses made, their Germinations, Numbers Potted and Numbers Planted in the Field Nursery.

GROUP	CROSS	No. Germinated	No. PLANTED IN FIELD NURSERY	
			Singles	Bunches
<i>S. officinarum</i> Noble	Ba.11569 x Ajax	1,503	215	211
<i>S. officinarum</i> x <i>S. spontaneum</i>				
2nd Dacca Nobilisation ...	Otaheite x B.39250 ...	15	15	—
2nd Glagah Nobilisation ...	Ba.11569 x B.44131	55	43	—
	Synthetic Kassoer x Comus	82	81	—
	B.44130 x Comus	121	110	—
	B.44132 x Comus	111	105	—
3rd Glagah Nobilisation ...	B.3439 x Eros	714	667	—
4th Glagah Nobilisation ...	Eros x Self	475	400	—
	B.39220 x Self	18	16	—
1st Tukuyu Nobilisation ...	Tukuyu No. 2 x Comus	3	3	—
		1,594	1,440	—
<i>S. officinarum</i> x <i>S. sinense</i>				
1st Sinense Nobilisation ...	Merthi x B.3915	2	2	—
<i>S. officinarum</i> x <i>S. robustum</i>				
1st Robustum Nobilisation ...	Otaheite x 51NG.63	45	44	—
	Ba.11569 x 51NG.63	2,510	504	355
		2,555	548	355
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. spontaneum</i>				
Noble x Local x Glagah ...	Trojan x Pindar	91	33	11
	B.3439 x Pindar	46	46	—
	B.51311 x Co.270	30	27	—
	B.51355 Polycross	580	552	—
	B.52298 Polycross	184	162	—
	B.53200 Polycross	52	48	—
Noble x Local x Glagah x Celebes	Ba.11569 x B.48394	10	9	—
		993	877	11
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>				
Noble x Local x Barberi ...	Trojan x Co.290	881	388	42
	B.3365 x CP.44—101	159	156	—
Noble x Glagah x Barberi ...	H.32—8560 x Eros	1,266	448	157
	H.32—8560 x B.4864	1,228	402	165
	B.3439 x U.1331	192	186	—
	B.37161 x CP.29—116	16	16	—
	B.37161 x J.3	156	145	—

APPENDIX I — (Continued)

GROUP	CROSS	No. Germi- nated	NO. PLANTED IN FIELD NURSERY	
			Singles	Bunches
Noble x Local x Glagah x Barberi	Co. 421 x CP. 44—101	39	37	—
	Co. 421 x B. 5411	2,315	229	373
	Co. 421 x B. 5480	189	181	—
	Co. 421 x B. 54163	1,000	729	—
	Co. 421 x C. 345	174	166	—
	D. 62/43 x NCo. 310	487	474	—
	D. 62/43 x B. 41227	101	90	—
	H. 32—8560 x Co. 991	59	56	—
	H. 32—8560 x B. 42231	16	8	—
	H. 32—8560 x B. 4738	18	18	—
	H. 32—8560 x B. 4744	37	37	—
	H. 32—8560 x B. 52298	356	350	—
	H. 32—8560 x B. 5301	10	8	—
	P.R. 1000 x B. 41227	214	184	—
	P.R. 1000 x B. 41276	17	17	—
	P.R. 1000 x B. 49257	17	17	—
	P.R. 1000 x C. 4144	638	569	—
	Trojan x B. 41227	141	130	—
	Trojan x B. 49119	98	98	—
	Ba. 11569 x NCo. 330	20	18	—
	B. 3365 x Co. 775	47	47	—
	B. 3365 x NCo. 310	22	21	—
	B. 3365 x B. 42231	32	29	—
	B. 3365 x B. 49119	188	173	—
	B. 3439 x NCo. 310	2,250	339	307
	B. 3439 x Q. 50	310	288	—
	B. 37161 x B. 53200	65	62	—
	B. 37161 x B. 54235	62	62	—
	B. 37161 x C. 4122	14	12	—
	B. 4092 x B. 51134	85	80	—
	B. 40105 x B. 49119	1,012	490	97
	B. 4145 x NCo. 310	21	20	—
	B. 4145 x B. 4744	55	55	—
	B. 4214 x B. 4098	137	125	—
	B. 42231 x Self	41	39	—
	B. 42279 x B. 49119	50	47	—
	B. 45137 x B. 51355	241	231	—
	B. 4744 x Self	48	48	—
	B. 48361 x B. 4744	80	80	—
	B. 4906 x NCo. 310	29	29	—
	B. 5012 x B. 4738	375	222	17
	B. 5028 x Co. 290	885	417	86
	B. 5028 x Pindar	191	123	—
	B. 50215 x U. 1121	263	261	—
	B. 52315 x B. 4098	595	312	52
	B. 52389 x B. 41211	101	90	—
	B. 52389 x B. 41227	41	38	—
	B. 53267 x B. 42231	96	95	—
	B. 53348 x B. 41211	3,138	944	191
	B. 53348 x B. 4738	5	5	—
	B. 53348 x B. 49119	125	120	—
	B. 54243 x Co. 331	7	7	—
	B. 5650 x B. 4744	366	353	—
	B. 56104 x B. 42231	91	89	—
	F. 36—819 x B. 48177	9	8	—
Noble x Local x Glagah x Celebes x Barberi	P.R. 1000 x B. 50377	100	92	—
	B. 3439 x B. 50377	850	246	116
	B. 4145 x B. 50377	12	12	—
	B. 43283 x B. 42231	304	287	—

APPENDIX I — (Continued)

GROUP	CROSS	No. Germi- nated	No. PLANTED IN FIELD NURSERY	
			Singles	Bunches
Noble x Local x Glagah x Celebes x Barberi	B.43295 x B.4098	37	37	—
	B.43295 x B.47320	50	49	—
	B.43295 x B.49119	40	38	—
	B.45137 x B.49380	328	315	—
	B.50210 x Pindar	302	285	—
Noble x Local x Glagah x Tukuyu x Barberi	B.6003 x B.47320	66	66	—
		23,010	11,945	1,603
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> Noble x Celebes x Sinense Noble x Local x Sinense	Ba.11569 x B.47184	3	3	—
	B.39254 x Co.270	15	15	—
		18	18	—
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. sinense</i> Noble x Barberi x Sinense	Otaheite x B.47331	5	0	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i> Noble x Local x Barberi x Sinense	B.3365 x B.45151	552	524	—
	B.45152 x B.45151	150	147	—
Noble x Glagah x Barberi x Sinense	M.134/32 x B.45116	15	15	—
Noble x Celebes x Barberi x Sinense	B.39254 x B.45109	38	38	—
Noble x Local x Glagah x Barberi x Sinense	F.36—819 x B.45151	586	578	—
	H.32—8560 x B.45151	1,626	510	218
	H.32—8560 x B.54142	74	70	—
	P.R.1000 x B.51148	3,116	251	399
	B.3439 x B.45151	406	263	—
	B.37266 x B.4098	14	14	—
	B.39254 x B.42231	220	206	—
	B.42304 x B.45151	903	325	109
	B.4373 x B.45151	606	582	—
	B.44111 x B.4098	3,238	494	294
	B.44341 x B.4098	10	10	—
	B.45119 x B.49119	283	277	—
	B.45152 x F.31—962	6	5	—
	B.45152 x NCo.310	19	15	—
	B.45152 x B.4098	399	380	—
	B.45152 x B.41211	250	243	—
	B.45152 x B.52298	41	40	—
	B.45154 x B.45151	1,351	607	145
	B.45220 x B.54163	27	23	—
	B.48330 x B.45151	44	41	—
	B.5012 x B.45151	170	161	—
	B.51243 x NCo.310	27	26	—
	B.53267 x B.45151	195	185	—
	B.53355 x B.49119	132	125	—
	B.56104 x B.45151	271	269	—

APPENDIX I—(Continued)

GROUP	CROSS	No. Germinated	No. PLANTED IN FIELD NURSERY	
			Singles	Bunches
Noble x Local x Glagah x Celebes x Barberi x Sinense	B.50146 x B.50377	24	22	—
	B.50210 x B.45151	34	32	—
	B.52371 x B.45151	245	220	—
Noble x Local x Celebes x Barberi x Sinense	B.43283 x B.45151	1,652	270	269
	B.35247 x B.45151	2,364	324	397
Noble x Glagah x Celebes x Barberi x Sinense	B.45154 x B.45109	112	107	—
Noble x Dacca x Local x Glagah x Barberi x Sinense	B.47399 x B.4862	29	28	—
		19,229	7,427	1,831
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. robustum</i>				
Noble x Celebes x Robustum	Otaheite x B.47199	254	203	—
	B.11569 x B.47157	264	259	—
	Ba.11569 x B.47198	39	37	—
Noble x Local x Glagah x Robustum	Trojan x B.44226	234	195	—
	Trojan x B.44227	433	394	—
		1,224	1,088	—
<i>S. officinarum</i> x <i>S. barberi</i> x <i>S. robustum</i>				
Noble x Barberi x Robustum	B.3365 x 51 NG.63	200	161	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i>				
Noble x Local x Glagah x Barberi x Robustum	B.45198 x B.4744	414	372	—
	B.53179 x B.49119	76	74	—
	B.5652 x B.49119	670	323	63
Noble x Local x Glagah x Celebes x Barberi x Robustum	B.50210 x B.44226	29	27	—
Noble x Local x Barberi x Robustum	B.46103 x 51NG.63	42	40	—
		1,231	836	63
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> x <i>S. robustum</i>				
Noble x Glagah x Celebes x Sinense x Robustum	B.441 x B.57100	169	168	—
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i> x <i>S. robustum</i>				
Noble x Local x Glagah x Barberi x Sinense x Robustum	B.4523 x B.45151	1	0	—
	B.5651 x B.45151	654	610	—
	B.5652 x B.45151	123	121	—
		778	731	—
TOTALS		52,511	25,456	4,074

APPENDIX I — (Concluded)

GROUP	CROSS			No. Germi- nated	NO. PLANTED IN FIELD NURSERY	
					Singles	Bunches
Selfs and Inbreds for Research Programme						
<i>Saccharum officinarum</i>						
Noble	B. 3915	x Self	8	7	—	
<i>S. officinarum</i> x <i>S. spontaneum</i>						
Noble x Local x Glagah	Co. 421	x Self	92	90	—	
	D. 2451	x Self	250	213	—	
			342	303	—	
<i>S. officinarum</i> x <i>S. barberi</i>						
3rd Barberi Nobilisation	U. 112	x Self	54	50	—	
	U. 1124	x Self	20	14	—	
	U. 1422	x Self	44	43	—	
			118	107	—	
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>						
Noble x Local x Barberi	L. 1	x Self	79	76	—	
	R. 3321	x Self	270	204	—	
Noble x Glagah x Barberi	Ba. 11569	x J. 31	11	10	—	
	Ba. 11569	x J. 35	91	88	—	
	B. 5012	x Self	43	39	—	
Noble x Local x Glagah x Barberi	C. 343	x Self	35	34	—	
	C. 356	x Self	55	51	—	
	T. 22	x Self	121	118	—	
	W. 1	x Self	257	225	—	
			962	845	—	
<i>S. spontaneum</i>						
Celebes	Toledo	x Self	9	9	—	
SUB-TOTALS ...			1,439	1,271	—	
GRAND TOTALS ...			53,950	26,727	4,074	

APPENDIX II.

SUGAR CANE FIRST YEAR SEEDLING TRIAL — B.61' SERIES

List of Crosses and Number of Seedlings of each Planted in the Field Nursery (May 1959) and in the First Year Seedling Trial (October 1959)

GROUP	CROSS	NO. PLANTED IN FIELD NURSERY		No. Planted in First Year Seedling Trial
		Singles	Bunches	
<i>S. officinarum</i>				
Noble	Ba. 11569 x Badila	18	—	7
Noble	Ba. 11569 x 28NG. 13	341	57	50
		359	57	57
<i>S. officinarum</i> x <i>S. spontaneum</i>				
4th Glagah Nobilisation	B. 3439 x CP. 36—154	56	—	12
5th Glagah Nobilisation	M. 134/32 x Badila	444	—	44
1st Celebes Nobilisation	Ba. 11569 x Tabongo	12	—	4
3rd Celebes Nobilisation	B. 35247 x Comus	73	—	6
Noble x Local x Glagah	Co. 421 x D. 251	746	401	121
	Co. 421 x D. 2452	362	—	55
	B. 37172 x Pindar	60	—	18
Noble x Local x Celebes x Glagah	Trojan x B. 46364	15	—	6
Noble x Local x Glagah x Dacca	Trojan x B. 49224	5	—	4
		1,773	401	270
<i>S. officinarum</i> x <i>S. barberi</i>				
2nd Barberi Nobilisation	P.O.J. 213 x B. 391	1	—	—
3rd Barberi Nobilisation	B. 3365 x CP. 36—154	53	—	14
4th Barberi Nobilisation	Ba. 11569 x U. 1124	21	—	4
	B. 37161 x Comus	2	—	2
		77	—	20
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>				
Noble x Local x Barberi	Ba. 11569 x R. 3321	95	—	34
	B. 3013 x CP. 28—11	201	—	13
	B. 37161 x Co. 270	87	—	15
	B. 37161 x Co. 313	8	—	—
	B. 37161 x CP. 28—11	133	—	13
	B. 45121 x Badila	4	—	2
	R. 334 x U. 112	9	—	3
Noble x Glagah x Barberi	H. 32—8560 x B. 37193	316	109	67
	M. 134/32 x B. 4362	1	—	—
	M. 134/32 x U. 1221	6	—	4
	M. 134/32 x U. 1421	19	—	9
	P.O.J. 3016 x B. 41227	380	—	79
	Ba. 11569 x B. 52107	314	—	62
	Ba. 11569 x J. 31	1	—	—
	B. 3439 x B. 37193	191	223	67
	B. 35207 x P.O.J. 2878	167	102	32
	B. 35207 x B. 52107	—	—	5
	B. 37161 x Eros	403	—	198

APPENDIX II (Continued)

GROUP	CROSS	No. PLANTED IN FIELD NURSERY		No. Planted in First Year Seedling Trial
		Singles	Bunches	
Noble x Glagah x Celebes x Barberi	H. 32—8560 x B. 45109	51	—	21
	H. 32—8560 x B. 46364	6	—	3
	B. 5012 x B. 46364	6	—	4
Noble x Glagah x Dacca x Barberi Noble x Local x Glagah x Barberi	B. 37161 x B. 49224	125	—	48
	Co. 421 x B. 4098	197	—	39
	Co. 421 x B. 47320	280	152	75
	Co. 421 x B. 52107	450	215	137
	F. 36—819 x B. 4098	204	—	80
	F. 36—819 x B. 42231	4	—	4
	F. 36—819 x B. 4362	11	—	9
	F. 36—819 x B. 47314	4	—	1
	F. 36—819 x B. 47380	31	—	10
	F. 36—819 x B. 5480	16	—	13
	D. 62/43 x B. 49119	177	—	25
	H. 32—8560 x Pindar	297	—	81
	H. 32—8560 x B. 5121	5	—	2
	M. 134/32 x B. 42231	4	—	3
	P. R. 1000 x B. H. 10 (12)	42	—	3
	Trojan x B. 49119	29	—	8
	Ba. 11569 x C. 343	172	—	6
	B. 3172 x B. 49119	16	—	9
	B. 3439 x B. 4744	109	—	38
	B. 3439 x B. 49119	222	—	66
	B. 34102 x B. 4744	127	—	32
	B. 35207 x NCo. 330	14	—	3
	B. 35207 x D. 251	50	—	4
	B. 37161 x Pindar	1	—	—
	B. 37161 x B. 4098	228	—	71
	B. 37161 x B. 41211	645	148	292
	B. 37161 x B. 4744	2	—	1
	B. 37161 x C. 413	51	—	16
	B. 37161 x D. 2451	88	—	19
	B. 4096 x B. 41227	106	—	31
	B. 4214 x B. 49119	151	—	23
	B. 42231 x Self	24	—	16
	B. 4373 x Pindar	6	—	4
	B. 4373 x B. 42231	46	—	17
	B. 43358 x B. 49119	300	—	32
	B. 45121 x B. 4744	54	—	14
	B. 45137 x B. 41227	341	360	131
	B. 45137 x B. 48392	383	—	70
	B. 45137 x B. 50382	498	217	210
	B. 45137 x B. 5121	361	—	96
Noble x Local x Glagah x Barberi	B. 45170 x B. 4744	477	—	52
	B. 45225 x B. 4744	425	250	91
	B. 47386 x B. 4098	249	154	158
	B. 48209 x B. 4744	3	—	2
	B. 49119 x Cornus	198	—	4
	B. 49119 x B. 34104	375	—	27
	B. 49282 x B. 4098	31	—	16
	B. 5041 x B. 4738	16	—	5
	B. 5041 x B. 49119	353	37	—
	plus	382	two's	138

APPENDIX II (Continued)

GROUP	CROSS	NO. PLANTED IN FIELD NURSERY		No. Planted in First Year Seedling Trial
		Singles	Bunches	
Noble x Local x Glagah x Barberi	B. 50135 x Self	313	—	45
	B. 54184 x B. 34104	109	—	37
	B. 52222 x Co. 270	47	—	7
	B. 52222 x B. 43229	11	—	3
	B. 52389 x B. 41227	158	—	17
	B. 52389 x B. 52107	502	—	82
	B. 5336 x B. 4098	205	61	77
	B. 54243 x B. 41227	4	—	2
	B. 5650 x B. 4098	14	—	4
	T. 11 x U. 1131	3	—	3
Noble x Local x Glagah x Celebes x Barberi	Co. 421 x B. 46265	465	218	81
	H. 32—8560 x B. 43375	9	—	7
	B. 39157 x B. 4744	5	—	4
	B. 39157 x B. 49119	7	—	2
	B. 43283 x B. 4747	316	—	43
	B. 43283 x D. 251	305	—	23
	B. 43380 x B. 49119	91	—	11
	B. 48165 x B. 4744	10	—	6
	B. 50210 x B. 46364	270	235	93
	B. 50210 x B. 49119	148	200	58
	B. 52321 x B. 43375	278	—	70
	B. 52371 x B. 34104	140	—	19
	B. 52371 x D. 251	350	—	27
	B. 52371 x U. 1122	316	—	46
	C. 31 x B. 46364	133	—	26
Noble x Local x Glagah x Dacca x Barberi	B. 4581 x B. 4098	10	—	7
	Tukuyu No. 2 x B. 41227	99	—	14
		14,714	3,063	3,677
<i>S. officinarum</i> x <i>S. Sinense</i>				
1st Sinense Nobilisation	Merthi x B. 391	1	—	1
	Uba x B. 603	3	—	3
2nd Sinense Nobilisation	C. H. 64/21 x Ba. 8069	60	—	7
	B. 37226 x Ba. 6032	20	—	1
	B. 37226 x B. 3915	16	—	7
		100	—	19
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i>				
Noble x Local x Glagah x Sinense	Trojan x H. 32—1063	3	—	—

APPENDIX II (Continued)

GROUP	CROSS	NO. PLANTED IN FIELD NURSERY		No. Planted in First Year Seedling Trial
		Singles	Bunches	
Noble x Local x Glagah x Sinense	Trojan x B.51152	16	—	5
	B.441 x D.213	82	—	16
Noble x Glagah x Celebes x Sinense	B.441 x B.46364	5	—	2
	Otaheite x B.51152	49	—	32
	Otaheite x B.51269	110	—	26
Noble x Glagah x Sinense	Ba.11569 x B.35276	83	—	19
	Ba.11569 x B.51270	17	—	10
	B.45220 x CP.36—154	236	102	62
	B.1125 x E.2411	367	—	45
		968	102	217
<i>S. officinarum x S. spontaneum x S. barberi x S. sinense</i>				
Noble x Local x Barberi x Sinense	B.4214 x B.45151	249	50	46
	B.45121 x B.45151	816	190	—
	B.45152 x Badila	plus 2	289 two's	206
	B.45152 x Co.270	175	—	16
	B.47329 x B.H.10 (12)	5	—	2
Noble x Glagah x Barberi x Sinense	Ba.11569 x B.4543	135	—	37
Noble x Local x Glagah x Barberi x Sinense	Co.421 x B.45151	386	219	114
	H.32—8560 x B.47258	35	—	22
	M.134/32 x B.47258	25	—	11
	P.R.1000 x B.47258	600	133	189
	B.37172 x B.47258	25	—	7
	B.39254 x B.4098	12	—	6
	B.40272 x B.4744	112	—	32
	B.40272 x B.5480	10	—	5
	B.45152 x B.41227	2	—	—
	B.45152 x B.43214	12	—	4
	B.47399 x B.3337	29	—	3
	B.48209 x B.54142	60	—	17
	B.5041 x B.54142	137	—	23
	B.51129 x B.45151	19	—	7
	B.51167 x B.45151	35	—	10
Noble x Local x Glagah x Celebes x Barberi x Sinense	B.50210 x B.47258	188	151	67
		2,069	1,032	824
<i>S. officinarum x S. spontaneum x S. robustum</i>				
Noble x Celebes x Robustum	Otaheite x B.47156	603	—	38
Noble x Glagah x Robustum	G.332 x Self	—	—*	7
Noble x Local x Robustum	Trojan x 32MQ.629	1	—	—
Noble x Local x Glagah x Robustum	Trojan x B.4524	7	—	5
		611	—	50

* not estimated.

APPENDIX II (Concluded)

GROUP	CROSS	No. PLANTED IN FIELD NURSERY		No. Planted in First Year Seedling Trial
		Singles	Bunches	
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i>				
Noble x Local x Glagah x Barberi x Robustum	B. 4214 x B. 51242	206	106	58
	B. 4455 x B. 4098	18	—	8
	B. 4523 x B. 47419	7	—	—
	B. 45117 x B. 51242	12	—	4
	B. 48357 x B. 4744	5	—	2
Noble x Glagah x Barberi x Robustum	B. 3439 x H. 37—1933	92	—	28
	B. 37161 x B. 51242	92	—	23
	A. 133 x G. 331	1	—	—
		433	106	123
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S.</i> <i>barberi</i> x <i>S. sinense</i> x <i>S. robustum</i>				
Noble x Glagah x Barberi x Sinense x Robustum	B. 48306 x B. 37193	127	—	10
	B. 48306 x B. 4098	261	120	52
		388	120	62
	Open pollinated	—	—*	62
	GRAND TOTALS	22,492	4,881	5,381

* not estimated.

APPENDIX III

B.60' SERIES

Details of Final Selections from the First Year Trial

GROUP	CROSS	No. of Seedlings Reaped	No. Finally Selected (Breeding)	% Final Selection
<i>S. officinarum</i>				
Noble	Ba. 11569 x Comus ...	90	0	0
Noble	Otaheite x Badila ...	6	0	0
		96	0	
<i>S. officinarum</i> x <i>S. spontaneum</i>				
1st Tukuyu Nobilisation	Tukuyu No.2 x B. 417	2	(2)	100
3rd Glagah Nobilisation	P.O.J. 3016 x B. 3337 ...	13	3	23
	B. 37172 x B. 3337 ...	55	5	9
4th Glagah Nobilisation	B. 3439 x B.H.10 (12)	3	1	33
3rd Celebes Nobilisation	B. 35247 x B. 603 ...	20	(2)	10
Noble x Local x Glagah	Ba. 11569 x Co. 432 ...	12	0	0
	P.O.J. 2878 x B. 52298 ...	199	5	3
	Co. 421 x Comus ...	33	2	6
	Trojan x P.O.J. 2878	40	2	5
	Trojan x B. 41211	46	1	2
	B. 3439 x B. 5301 ...	1	1	100
	B. 3439 x B. 53200	40	1	3
	B. 3439 x B. 54193 ...	61	5	8
	B. 4145 x B. 5301 ...	12	0	0
	B. 5452 x B. 41211	52	2	4
Noble x Glagah x Celebes	B. 3439 x B. 46364 ...	36	5	14
Noble x Local x Glagah x Celebes	B. 48165 x B. 603 ...	8	(1)	13
		633	38	
<i>S. officinarum</i> x <i>S. barberi</i>				
4th Barberi Nobilisation	B. 35207 x 28NG.13	3	(1)	33
	B. 37161 x B. 3915 ...	1	0	0
		4	1	33
<i>S. officinarum</i> x <i>S. sinense</i>				
2nd Sinense Nobilisation	Ba. 11569 x B. 35269 ...	5	0	0
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i>				
Noble x Local x Barberi	Trojan x Co. 281 ...	7	0	0
	Trojan x B. 34104 ...	26	0	4
	B. 45225 x Q. 813 ...	25	0	0
	R. 333 x E. 2412 ...	54	2	4
	R. 333 x T. 11 ...	52	2	4

APPENDIX III (Continued)

B.60' SERIES

Details of Final Selections from the First Year Trial

GROUP	CROSS	No. of Seed- lings Reaped	No. Finally Selected (Breed- ing)	% Final Sele- ction
Noble x Glagah x Barberi	Q.813 x J.32 ...	62	1	1
	B.34102 x B.41227 ...	7	2	29
	B.35207 x P.O.J.2878	85	5	6
	B.37161 x H.44—3098	6	0	0
	B.37161 x E.2412 ...	60	4	7
	B.4362 x B.51192 ...	39	1	3
	J.36 x Q.813 ...	1	0	0
	J.34 x Q.813 ...	1	(1)	100
	J.1 x C.4153 ...	10	0	0
Noble x Local x Glagah x Barberi	Co.213 x C.12 ...	37	0	0
	Co.413 x NCo.310	48	1	2
	Co.413 x B.4098 ...	58	2	3
	Co.421 x B.4098 ...	85	5	6
	Co.421 x R.321 ...	17	0	0
	Co.421 x B.4511 ...	106	4	4
	D.62/43 x B.46136 ...	18	1	6
	F.36—819 x B.34104 ...	69	4	6
	F.36—819 x B.41211 ...	202	14	7
	H.32—8560 x Co.281 ...	28	0	0
	H.32—8560 x NCo.310	84	7	8
	H.32—8560 x B.34104	48	1	2
	H.32—8560 x B.41211	123	12	10
	H.32—8560 x B.43234	6	2	33
	H.32—8560 x B.49119	105	13	13
	M.134/32 x B.4098 ...	84	5	6
	Pepe Cuca x B.41211 ...	22	0	0
	P.R.1000 x B.37193 ...	36	3	8
	P.R.1000 x B.4098 ...	47	3	6
	P.R.1000 x B.47419 ...	18	1	6
	P.R.1000 x B.49119 ...	48	5	10
	P.R.1000 x B.52298 ...	49	2	4
	Trojan x CP.29—116	63	1	1
	Trojan x B.4098 ...	109	0	0
	Trojan x B.50347 ...	68	2	3
	Trojan x B.5387 ...	1	0	0
	B.3353 x B.34104 ...	98	4	4
	B.3439 x B.34104 ...	41	2	5
	B.3439 x B.43235 ...	21	2	10
	B.3439 x 49119 ...	58	4	7
	B.3439 x B.50347 ...	24	3	13
	B.3439 x B.51321 ...	67	6	9
	B.37161 x NCo.310	60	5	8
	B.37161 x Q.50 ...	81	4	5
	B.37161 x B.4098 ...	180	7	4
	B.37161 x B.47312 ...	11	1	9
	B.37172 x H.3 ...	70	1	1
	B.37172 x Q.50 ...	20	1	5
	B.37172 x B.49119 ...	29	2	7
	B.38233 x B.4744 ...	18	0	0
	B.40105 x B.41227 ...	118	5	4
	B.4145 x Co.290 ...	88	0	0
	B.4145 x B.49119 ...	86	12	14

APPENDIX III (Continued)

B.60' SERIES

Details of Final Selections from the First Year Trial

GROUP	CROSS	No. of Seed- lings Reaped	No. Finally Selected (Breed- ing)	% Final Selec- tion
Noble x Local x Glagah x Barberi	B.4214 x B.4744 ...	25	6	24
	B.4214 x B.54193 ...	76	1	1
	B.42279 x B.49119 ...	17	1	6
	B.4362 x B.4744 ...	8	0	0
	B.4362 x B.49119 ...	122	8	7
	B.4373 x B.4744 ...	26	1	4
	B.4547 x B.4098 ...	39	5	13
	B.45137 x B.4098 ...	9	1	11
	B.4733 x B.47419 ...	16	1	6
	B.48209 x B.49119 ...	37	0	0
	B.48330 x B.49119 ...	91	7	8
	B.48330 x B.53227 ...	7	0	0
	B.4906 x B.4098 ...	290	2	1
	B.4906 x B.41227 ...	107	0	0
	B.4906 x B.4744 ...	35	1	3
	B.5011 x B.49119 ...	295	7	2
	B.5012 x B.34104 ...	30	0	0
	B.5012 x B.52298 ...	9	0	0
	B.5012 x C.12 ...	67	3	5
	B.50184 x B.49119 ...	29	1	3
	B.51129 x B.4098 ...	53	1	2
	B.51131 x B.4098 ...	44	0	0
	B.51311 x H.44—3098	51	3	6
	B.51311 x B.4098 ...	48	2	4
	B.51311 x B.4788 ...	58	7	12
	B.51311 x B.50347 ...	4	1	25
	B.51311 x B.53227 ...	2	0	0
	B.52321 x B.4098 ...	5	0	0
	D.25 x U.113 ...	10	2	20
	B.5401 x B.4098 ...	81	2	2
	E.2412 x R.333 ...	14	0	0
Noble x Local x Celebes x Barberi Noble x Glagah x Celebes x Barberi	Ba.11569 x B.47177 ...	54	(2)	4
	B.37172 x B.47151 ...	3	0	0
Noble x Local x Glagah x Celebes x Barberi	H.32—8560 x B.50377	216	9	4
	B.37161 x B.50377 ...	7	3	43
	B.4362 x B.50377 ...	33	0	0
	B.43283 x B.46136 ...	6	1	17
	B.43295 x NCo.310	6	0	0
	B.5082 x B.4093 ...	4	0	0
	B.50370 x C.12 ...	47	1	2
		5,165	244	

APPENDIX III (Continued)

GROUP	CROSS	No. of Seed- lings Reaped	No. Finally Selected (Breed- ing)	% Final Selec- tion
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. sinense</i>				
Noble x Local x Glagah x Barberi x Sinense	P.R. 1000 x B.45151 ...	30	1	3
	B. 3439 x B.45151 ...	193	4	2
	B. 35207 x CP. 38—34	28	(1)	4
	B. 39254 x Q. 50 ...	3	1	33
	B. 39254 x B.4744 ...	36	0	0
	B. 44111 x B.49119 ...	31	7	22
	B. 44341 x B.45151 ...	11	1	9
	B. 44341 x B.52107 ...	11	0	0
	B. 45119 x B.47258 ...	41	3	7
	B. 45137 x B.47258 ...	29	1	4
	B. 45154 x B.34104 ...	106	2	2
	B. 45154 x B.4744 ...	35	0	0
	B. 45220 x B.4744 ...	40	3	8
	B. 5055 x B.45151 ...	111	4	4
Noble x Local x Barberi x Sinense	Co. 413 x B.45151 ...	26	0	0
	Trojan x B.45151 ...	21	0	0
	B. 37161 x B.45151 ...	24	4	17
	B. 4145 x B.45151 ...	62	4	6
	B. 45152 x B.34104 ...	4	0	0
Noble x Glagah x Barberi x Sinense	B. 37161 x B.2224 ...	183	2	1
		1,025	38	
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i>				
Noble x Glagah x Sinense	B. 45220 x B.4604 ...	45	1	2
	B. 2227 x Self ...	2	(1)	50
Noble x Celebes x Sinense	B. 47183 x Ajax ...	15	1	7
Noble x Local x Glagah x Sinense	B. 39254 x B.41211 ...	36	1	3
		98	4	
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. barberi</i> x <i>S. robustum</i>				
Noble x Local x Glagah x Barberi x Sinense	B. 45198 x C.12 ...	63	(1)	1
	B. 49388 x B.49119 ...	109	7	6
	B. 5652 x B.4098 ...	43	0	0
Noble x Glagah x Barberi x Robustum	B. 35207 x G.3 ...	2	0	0
	B. 4145 x H.37—1933	153	8	5
	B. 49170 x Ajax ...	21	0	0
	B. 47155 x B.49119 ...	128	3	2
		519	19	

APPENDIX III (Concluded)

GROUP	CROSS	No. of Seedlings Reaped	No. Finally Selected (Breeding)	% Final Selection
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. robustum</i>				
Noble x Glagah x Robustum	B.3439 x B.51242 ...	131	1	1
<i>S. officinarum</i> x <i>S. spontaneum</i> x <i>S. sinense</i> x <i>S. robustum</i>				
Noble x Glagah x Sinense x Robustum	B.4213 x G.33 ...	12	1	8
	GRAND TOTALS ...	7,686	346	

Note: 6 further selections were numbered in the B.60" series: these were selected from the original nursery without formal first year trial, making 352 in all.

APPENDIX IV

THIRD YEAR SEEDLING TRIALS — B.54' SERIES — AVERAGE RESULTS FOR PLANT CANE, FIRST AND SECOND RATOON CROPS 1958 — 60.

<i>Trial</i>	Spencers	Staple Grove	Buttals	Orange Hill	Todds
<i>Rainfall p.a.</i>	ca. 43"	ca. 51"	ca. 55"	ca. 57"	ca. 65"
	TONS CANE PER ACRE				
B.41211	30.47	35.80	—	—	—
B.4744	—	—	44.27	44.67	46.23
B.49119	36.26	44.07	41.75	46.45	54.44
B.5319	22.92	27.93	37.58	32.84	35.04
B.53164	22.16	33.64	40.29	35.67	41.50
B.5401	28.48	33.97	36.22	38.85	43.22
B.5480	26.43	35.44	39.09	41.31	43.53
B.5490	23.49	30.00	38.62	27.75	37.48
B.54142	25.31	37.16	45.12	45.30	48.54
B.54163	29.85	30.62	35.72	34.77	36.56
B.54172	27.88	38.01	38.49	36.63	36.72
B.54193	30.84	38.18	38.46	35.32	43.88
B.54215	21.08	29.40	32.07	31.64	36.80
B.54235	28.99	34.26	30.50	35.16	37.58
B.54253	21.13	33.48	39.18	41.20	37.72
B.54262	28.84	42.97	43.38	37.21	40.44
B.54277	28.34	38.13	41.61	45.40	42.42
NCo.310	19.22	26.17	33.77	31.28	32.78
H.37—1933	26.15	28.03	34.34	32.29	32.61
SE per plot % G.M.	10.3	9.9	8.1	8.6	10.9
LSD (P=0.05)	3.15 tons	3.91 tons	3.56 tons	3.72 tons	5.08 tons

SUCROSE IN JUICE (PURITY)*

B.41211	17.6(85)	18.9(89)	—	—	—
B.4744	—	—	19.8(90)	18.4(87)	18.5(88)
B.49119	18.9(88)	20.2(91)	20.1(90)	18.1(86)	18.2(87)
B.5319	20.7(90)	21.0(93)	20.7(91)	20.4(91)	20.3(92)
B.53164	18.6(88)	20.4(90)	20.3(89)	19.5(89)	19.3(88)
B.5401	19.6(90)	20.4(91)	20.5(91)	20.1(90)	20.0(91)
B.5480	19.1(91)	20.0(92)	20.2(92)	19.4(91)	18.9(90)
B.5490	20.5(92)	20.6(92)	20.5(92)	19.3(90)	20.2(92)
B.54142	19.4(90)	20.3(92)	20.6(91)	20.2(91)	19.3(91)
B.54163	20.1(90)	21.1(92)	20.7(91)	19.5(88)	20.6(91)
B.54172	19.2(91)	19.9(92)	20.5(92)	19.1(90)	19.2(92)
B.54193	18.1(86)	18.5(89)	18.1(86)	14.1(80)	16.7(86)
B.54215	18.7(90)	19.4(92)	18.5(91)	17.6(88)	17.5(89)
B.54235	17.4(88)	18.6(91)	19.0(90)	18.8(92)	19.3(92)
B.54253	18.4(90)	20.1(92)	20.2(91)	19.1(90)	19.5(91)
B.54262	16.5(86)	17.9(90)	18.8(90)	16.8(85)	18.0(88)
B.54277	18.6(88)	19.3(90)	19.7(90)	19.4(91)	19.2(90)
NCo.310	21.0(90)	22.0(93)	21.5(91)	20.6(90)	20.5(91)
H.37—1933	19.1(88)	18.8(89)	19.5(89)	19.3(89)	18.6(91)

APPENDIX IV (Concluded)

THIRD YEAR SEEDLING TRIALS — B.54 SERIES — AVERAGE RESULTS FOR
PLANT CANE, FIRST AND SECOND RATOON CROPS 1958 — 60.

Trial	Spencers	Staple Grove	Buttals	Orange Hill	Todds
Rainfall p.a.	ca. 43"	ca. 51"	ca. 55"	ca. 57"	ca. 65"
	SUGAR PER ACRE* †				
B. 41211	4.82	6.37	—	—	—
B. 4744	—	—	7.98	7.54	7.52
B. 49119	6.26	8.36	7.93	7.66	9.23
B. 5319	4.72	5.66	7.73	6.30	6.29
B. 53164	3.75	7.03	8.22	6.75	6.98
B. 5401	5.20	6.66	7.42	8.03	8.77‡
B. 5480	5.17	7.86‡	7.75	7.65	7.10
B. 5490	4.04	5.45	7.72	5.40	6.63
B. 54142	4.50	7.00	9.57‡	8.57‡	8.61‡
B. 54163	5.01	6.41	7.47	6.34	7.80
B. 54172	5.22	6.81	7.11	5.94	5.98
B. 54193	5.51	6.90	6.37	4.19	6.47
B. 54215	3.75	5.12	5.83	4.63	5.71
B. 54235	4.93	5.84	5.50	5.97	7.39
B. 54253	3.38	6.22	7.99	6.98	5.93
B. 54262	4.99	7.32	7.86	5.98	6.68
B. 54277	5.00	6.88	8.26	8.44	7.25
NCo. 310	3.60	5.14	6.31	6.51	5.78
H. 37—1933	4.26	4.91	7.06	5.95	6.35
SE per plot % G.M.	9.3	10.1	8.5	12.2	9.4
LSD (P=0.05)	0.92 tons	1.37 tons	1.33 tons	1.70 tons	1.39 tons

*data from 2 blocks only.

†calculated using the Winter-Carp formula, taking no account of fibre content.

‡significantly better than B. 41211 or B. 4744.

